10. Communicating the Industrial Heritage of *Metro de Madrid*: A Successful Case-Study in Contemporary Spain

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10.1. Introduction and context

Industrial heritage in Europe constitutes a crucial component of the continent's economic and technological history, illustrating the progression of industries that have played a pivotal role in shaping modern economies. Numerous prominent companies throughout Europe have left enduring industrial legacies, spanning a wide array of sectors, including manufacturing, energy production, transportation, and telecommunications.

These legacies not only reflect the technological advancements of their time but also highlight the transformative impact of industrial development on societal and economic structures. The relevance of cultural and art promotion in corporate communication strategies for contemporary management models. In Spain, some corporations are developing new initiatives to support culture and arts (Herranz de la Casa, Manfredi-Sánchez and Cabezuelo-Lorenzo, 2015:217). Arts and culture can be a strong pillar supporting company goals on social and public responsibility. Along the same line, this work analyses Metro de Madrid's industrial heritage to make it known to the global academic world. This research starts from a very important premise that considers that the starting point is shared by two disciplines. Those are the Communication Sciences and Art History.

Industrial heritage must be shared and communicated to society, including public and private transportation companies. This is the successful case of Metro de Madrid. Information, the digital society, and advertising are pillars of contemporary life, shaping how we communicate, connect, and consume (García-López, 2016). In the digital age,

instant access to vast information empowers individuals and drives innovation, transforming education, business, and governance (Arellano-Toledo, 2013). Urban metro companies are vital for ensuring efficient mobility in large cities. They provide a fast, reliable, and environmentally friendly alternative to road-based transport, reducing traffic congestion and air pollution (Cabezuelo-Lorenzo, Bonete-Vizcaíno and Sánchez-Martínez, 2016: 102). By moving millions of passengers daily, metro systems enhance accessibility, connecting neighborhoods, workplaces, and essential services. Their scalability accommodates growing urban populations, supporting economic activity and social inclusivity (Cardozo, 2011).

As a company, Metro de Madrid has several important pieces of industrial heritage that showcase its rich history and technological evolution (Otamendi, 2002). Some of the most significant elements include infrastructure and old stations, maps and plans, vintage trains, signaling systems, and depots. Of course, it also includes very rich documentation and archives of more than 100 years of history. The arrival of the metro in Madrid marked the radical transformation of the city in the early years of the 20th century, and has continued to influence the social, cultural and economic structures of the region to this day.

Madrid Metro is considered one of the best in Europe. But, to understand this statement, what are the facts that can be provided to defend this assertion? Here we have a few facts. It has an extensive network. Madrid Metro is one of the largest and most efficient metro systems in Europe, due to technical and engineering reasons (Medina-Rodríguez, 2011), featuring 12 lines and over 300 stations. It connects the entire city and extends into the suburbs, making it a practical option for both locals and tourists. The Metro operates daily from 6:00 AM to 1:30 AM. During peak hours, trains run every 2 to 4 minutes, while off-peak frequencies can extend to every 10 to 15 minutes. Certain lines may have different schedules, particularly during maintenance periods. The Madrid metro has always been highly rated by its users (Egusquiza-Juaristi, 2011).

Madrid metro fares have changed. Traditionally it has not been a very expensive metro. It has always been subsidised. We are looking for a massive use by the citizens. So, another key point is the cheap ticketing system, according to Galván-Vallina (2005). Currently, the fare system includes various ticket options, such as single tickets, multi-journey tickets, and special tourist passes. A single ticket within Zone

A costs between €1.50 and €2, while a 10-journey ticket offers a discount at around €6. Tickets can be purchased at machines or authorized retailers. Low prices are based on the principle of environmental friendliness and sustainability. The aim is to achieve urban mobility with fewer cars. Madrid is currently fighting against decarbonisation.

The image of Madrid as a touristic destination is also very important. Madrid is a city that receives millions of tourists every year. Many of them use the metro to travel from the airport to the city centre. In 2024, Madrid experienced significant tourism growth. According to the search results, 10.6 million tourists visited Madrid in 2023. While the exact total for 2024 is not precisely stated, the tourism sector in Madrid is showing strong growth, with expectations of continued expansion. Tourism in Madrid already accounts for 8.6% of the region's GDP in 2024 (La Vanguardia, 2024).

Therefore, this form of public transport becomes a prime ambassador for the city, welcoming the visitor. Having a quality metro is key to a good reputation as a tourist destination. In this sense, a key point is the airport connection. The Line 8 provides direct access from the city center to Adolfo Suárez Madrid-Barajas Airport, taking approximately 20 minutes to reach Terminal 4 (T4) and just 12 minutes to Terminals T1, T2, and T3. This makes it a convenient choice for travelers.

Finally, another reason for success is the integration of the metro into the transport network that thousands of Madrilenians use every day to go to work, study or move around the city. It is part of an integrated transport system that includes buses and suburban trains under the Madrid Transport Consortium (CTM). This allows for seamless transfers between different modes of transport using a single fare system, enhancing convenience for users.

10.2. Goals, methods, and tools

Studying industrial heritage requires a multidisciplinary approach, as it encompasses various aspects such as history, architecture, engineering, economics, and cultural studies. The best academic methodology to study industrial heritage integrates historical research, material analysis, and social context to provide a comprehensive understanding of industrial practices, their evolution, and their lasting impact on society. Therefore, this work has a descriptive and didactic purpose, but also an analytical one.

The aim of this research is to raise awareness of the industrial heritage of Metro de Madrid. To do so, we have worked with a methodological triangulation. Firstly, a review of the existing bibliography was carried out. For this purpose, the Spanish repository Dialnet, dependent on the University of La Rioja (Spain), was used. More than twenty doctoral theses on the Madrid Metro have been located. Only those with a direct theme related to the issue of heritage were selected. A total of 203 articles in periodicals, 29 book chapters, 22 doctoral theses in Spain and 11 books or monographs on this subject were located.

The second methodology applied was the content analysis of Metro de Madrid's public information through its digital tools. A study was carried out of the contents posted on its website. Finally, the content was organised, and a creative phase of writing and sharing was carried out by the authors of this work to offer a quality academic product that is also informative, interesting and suitable for all audiences.

The study of industrial heritage benefits from a holistic, interdisciplinary approach, combining historical research, material culture analysis, technological studies, and social science methodologies. These methods enable researchers to understand the multifaceted role of industrialization in shaping contemporary society and its lasting impact on culture, economics, and technology.

By integrating these methodologies, we, as scholars, can provide a nuanced interpretation of industrial heritage, contributing to its preservation, understanding, and appreciation from different fields and areas, from Communication Sciences to Art History.

10.3. The importance of *Metro de Madrid* in recent history

Since that first journey made by King Alfonso XIII, Metro has grown exponentially, parallel to the demographic and economic growth experienced by the Community of Madrid, to the 295 km and 302 stations that the current network has, placing it among the major suburban networks in the western world: it is the fourth largest network in terms of number of stations, behind the New York, Paris and London Metros, and the fourth largest network in terms of extension, behind the Moscow, London and New York metros. In 2023, 662.3 million users have chosen Metro as their mode of transport in the region.

There are several top issues on the history of the Metro de Madrid, recently. Maybe, from an industrial point of view, the most impor-

tant was related with the electricity (Matilla-Quiza and Frax-Rosales, 2002). Metro de Madrid has a pioneering electric underground system (Ruíz-Zapatero, 2016). It was conceived in the early 20th century and became one of the world's first electric underground systems. The first line, spanning 3.48 km with eight stations, was inaugurated on October 17, 1919, by King Alfonso XIII. This innovative project was funded through a combination of corporate funds (50%), public investment (40%), and the Spanish royal family (10%).

There is an obvious historical significance and cultural impact of Metro de Madrid in Spanish history. The metro system has played a significant role in Madrid's history. During the Spanish Civil War, Line 3 was used to transport victims out of the city, earning it the nickname "the metro of the dead". The system has preserved elements of its history, such as displaying a 1928 carriage at Alto de Arenal station.

However, it is not important only for its history. It is an alive mean of transportation for lots of people every day. Metro de Madrid has become an integral part of the city's identity, growing from 14 million users in its first year to over 662 million annual trips in recent years. Metro de Madrid suffered a rapid expansion and growth. It experienced significant expansion throughout its history. Within two years of its opening, Line 1 was extended and joined by Line 2. By 1936, a third line was added, followed by a fourth in 1944. The network grew to 10 separate lines by the end of the 1970s. Between 1996 and 2011, the length of the metro doubled to 294 kilometers.

From an architectural point of view, there has been a design evolution. The metro's design has evolved over time. Antonio Palacios, the architect who designed many of Madrid's iconic buildings, was responsible for styling the original stations. The figure of the architect Antonio Palacios (1874-1945) deserves special treatment. Later in this work, his contributions to the heritage of the Madrid Metro will be explained. Considered one of the most important and influential architects in Spain during the first half of the 20th century, Antonio Palacios was responsible for some of Madrid's most emblematic buildings that helped transform the former baroque villa into a modern metropolis.

Continuing with the historical landmarks, other points of interest are worth mentioning. Early stations featured vaulted ceilings and walls clad in blue and white tiles. More recent additions, like Valdezarza station on Line 7, showcase futuristic designs.

Another very important milestone was its change from a privately owned company to a public utility. There was a transition to public enterprise. In 1990, Metro de Madrid transitioned to a public enterprise. This change did not diminish the system's ambition, as it continued to expand with new lines and extensions, including a link to Madrid's Barajas Airport.

10.4. The mark of the architect Antonio Palacios on *Metro de Madrid*

The architect Antonio Palacios Ramilo (Galicia, 1874-Madrid, 1945), just known as Antonio Palacios, is considered as one of the most renowned Spanish architects (Metro de Madrid, 2025b). The value of the heritage of the Madrid metro has been highlighted once again thanks to the celebration of the 150th anniversary of the architect Antonio Palacios, in 2024. The Spanish architect was born in 1874 in Galicia (Spain). He left a lasting mark on Metro de Madrid with his visionary designs during its early development in last century. Palacios is mostly known for his significant contributions to early 20th-century architecture in Madrid (Olivares-Abengozar, 2016a).

Antonio Palacios conceived the stations as monumental yet functional spaces, blending modernity with artistic detail. His influence is most notable in the original Gran Vía and Chamberí stations, where he incorporated elegant ceramic tiling, wrought iron details, and clear signage, balancing beauty and utility. Palacios also designed the iconic Metro logo, reflecting his commitment to cohesive urban identity. His work established a standard for urban transport aesthetics, making Metro de Madrid a cultural and architectural landmark.

His works are characterized by their blend of historicist and modernist styles, often incorporating monumental forms, intricate details, and innovative materials. Palacios played a vital role in shaping the architectural identity of Madrid during his era, designing many iconic buildings and infrastructure projects that remain landmarks to this day (Olivares-Abengozar, 2016b). Palacios was instrumental in designing Madrid's first Metro stations when the system was inaugurated in 1919. His designs, including Chamberí station, were functional yet aesthetically appealing, using ceramic tiles, natural light, and elegant finishes.

About his legacy and style, it must be said that his work reflects an eclectic approach that combines historicist elements with the innovation

of modernism. His use of ceramics, bold forms, and attention to detail distinguished his projects, many of which emphasized public utility and urban transformation.

Palacios' influence extended beyond buildings, as he also designed street furniture and infrastructure, contributing to the modernization of Madrid's urban landscape. Palacios remains celebrated as one of Spain's most influential architects, leaving a legacy that continues to shape the architectural and cultural heritage of Madrid (Olivares-Abengozar, 2016c).

10.5. Metro de Madrid Museum Net

Metro de Madrid has developed several unique museum spaces that showcase its history and cultural heritage. These spaces allow visitors to explore the evolution of the Metro system and its role in Madrid's urban development. These museums and exhibition spaces not only preserve the history of Metro de Madrid but also serve as a testament to the city's architectural, technological, and cultural development. They provide a fascinating window into the evolution of public transportation and its impact on urban life.

10.5.1. The industrial museum of Nave de Motores

From an industrial point of view, this is one of the most important museums of Metro de Madrid. It was built between 1922 and 1923 and restored in 2008. Nowadays, the Pacífico Engine Shed retains its original appearance. The building houses three enormous diesel engines and the rest of the machinery (alternators, transformers, etc.) that once served to generate and transform the energy used to run the trains.

During the Civil War, due to restrictions, it came to provide electricity to the city through *the Unión Eléctrica Madrileña* company. With the passage of time and as the companies were able to ensure an increasingly regular supply, the power station, which at the time was the most powerful installed in Spain, became obsolete and stopped generating energy in the 1950s, being definitively closed in 1972.

The building stands out for the clarity of its conception, the attention to detail and good execution that characterise all the work of one of the great architects of the city's image in the first half of the 20th century, Antonio Palacios. The maintenance and conservation work that have been under-

taken, according to a project by the architect Carlos Puente, have returned the building to its original appearance, both inside and out, and have been accompanied by the cleaning and restoration of the machinery.

Thanks to these interventions and with the support of exhibition and musicographic elements, the power station has been recovered for the public as it was conceived.

10.5.2. The former metro station of Chamberí

Visiting Chamberí station offers a unique opportunity to step into the Madrid of the 1950s and 1960s, accessible merely by descending a few steps. Chamberí station was part of the inaugural Metro line in Madrid, established in 1919, which comprised eight stations: Cuatro Caminos, Ríos Rosas, Martínez Campos (Iglesia), Chamberí, Bilbao, Tribunal, Gran Vía, and Sol. By the early 1960s, the Metropolitan Company sought to lengthen the trains; however, the spatial constraints of Chamberí station rendered its extension unfeasible, leading to its closure on May 22, 1966.

The station's design, attributed to the renowned architect Antonio Palacios, embraced a functional and straightforward approach to layout and organization. Palacios incorporated natural light into the station through a skylight in the lobby, while the interiors were adorned with ceramic finishes featuring ornamental details. The vaulted ceiling of the station is clad in beveled white tiles, and its abutments are adorned with large panels of Sevillian tiles, which outline the frames of ceramic advertising signs in ochre and blue hues. These advertising signs, preserved nearly intact since their creation in the 1920s, remain one of the station's most remarkable attractions.

In addition, modern accessibility measures have been implemented to ensure the station is inclusive for individuals with disabilities. The restoration and construction of the new access points were carried out under the supervision of architects Pau Soler and Miguel Rodríguez, ensuring a sensitive integration of contemporary features with the station's historic character.

10.5.3. Exhibition of Historical Trains in Chamartín Metro Station and Museum

The Metro de Madrid features an exhibition of its historic trains within the museum space located at Chamartín station. This dedicated museum

showcases a collection of fully restored classic Metro trains, commemorating the centenary of the company's founding.

Inaugurated by King Felipe VI, the exhibition includes 12 historic train cars, notably featuring the first carriages that operated on Line 1 a century ago. Complementing the trains, the museum also displays nearly 100 historic artifacts related to the underground system. Admission to the exhibition is free for Metro passengers, providing a unique opportunity to explore the rich history of the Metro de Madrid.

According to González-Márquez (2006), Metro de Madrid has preserved some of them, forming part of its historical heritage. There are four carriages from those that inaugurated the first line between Sol and Cuatro Caminos in 1919. There are also carriages from the 1920s, from those delivered in 1936 shortly before the start of the Civil War and which later worked on the Opera North branch line, and from the early forties.

González-Márquez (2006) reminds us that the collection includes a pair of the first motor-engine units from the fifties for the tough ramps on lines 2 and 3, one of the primitive units of the Carabanchel Suburban Railway, two units of the 1000 series, which have been on line 5 for so many years. Also, part of the collection is an overhead line dresina built by Campagne in 1929, perhaps the oldest dresina preserved in Spain (González-Márquez, 2006).

10.5.4. Caños del Peral Underground Museum at Opera Station

Metro de Madrid's Ópera Station has an underground museum that houses an ancient stone fountain and its parallel infrastructures such as bridges and aqueducts. Ópera station has the largest underground archaeological museum in Madrid, a 200 m2 space where you can see archaeological remains from the 16th and 17th centuries belonging to the Fuente de los Caños del Peral, the Acueducto de Amaniel and the Alcantarilla del Arenal. Why is this museum hidden inside the Metro de Madrid so important? At the beginning of the 16th century, water did not reach the houses in Madrid, despite being an indispensable element in the development of the city, and the water supply was provided by cisterns or basins installed in squares or next to gates and walls. In the Modern Age, public fountains replaced the cisterns, and part of these fountains is what we find today in Ópera (Penedo-Cobo, 2010).

The *Fuente de los Caños del Peral* had six spouts and their corresponding basins. The water came from the spring with fat water in the Plazuela de los Caños. The Madrid Metro has an underground museum at the Ópera station, which is located in the city's Ópera station. These hydraulic elements bring history closer to all visitors, who can also access the audiovisual room to learn more about the remains on display (Penedo-Cobo, 2010).

The Amaniel Aqueduct dates back to the beginning of the 17th century, it had its source in what is now the Dehesa de la Villa and supplied water to the Royal Palace. The Arenal Sewer came to alleviate the problem of the evacuation of dirty water, which is why it was channelled so that it would flow into the Leganitos stream, at some point along the current Cuesta de San Vicente.

10.5.5. The Palaeontological site at Carpetana Metro Station

During the remodelling works at the Carpetana Metro Station, palaeontological remains were discovered with valuable findings from the Miocene, which has made it possible to reconstruct the palaeoenvironments in two vertical sites. The first of the spaces has a vinyl panel with images representing the palaeoenvironment existing more than 15 million years ago, with remains mainly corresponding to mastodons of the species *gonphotherium aungustidens.*

In addition, in this same exhibition area, a reconstruction of a deer called *heteroprox* has been included with the environments and plant species existing at that time in Carpetana that have been discovered thanks to the pollen and animal fossils recovered in the excavation.

The second space recreates the palaeoenvironment of approximately 14 million years ago, and some of the animals found in the excavations are represented, such as the bear-dog, the bear-wolf, a feline, a giant tortoise, rhinoceroses and a wild boar. Carpetana station is part of the Line 6 and this museum is open to the public every day during the station opening hours from 6:00 AM to 01:30 AM.

10.5.6. Former lobby of Pacífico Metro Station

The old lobby of the Metro de Madrid Pacífico Station is an original space dating from 1923, the year in which this Line 1 station was

opened with the extension from Atocha to Puente de Vallecas. It is located on the platform in the direction of Valdecarros. During the works of the sixties, the Company closed this entrance that was created by Antonio Palacios. The architectural project for the Pacífico complex was designed by Palacios included the engine shed, the underground station, offices, workshops, warehouses and the house of the engineer in charge of the facilities. The original project envisaged a vaulted vestibule with a central skylight, which was modified to the current rectangular floor plan with strong buttresses dividing it into three sections and three more vaults, with smaller skylights in their centres. There was a single access from what was then Calle del Pacífico, now Avenida Ciudad de Barcelona, on the corner of the street called Calle de la Caridad. In 1961, the platforms were extended from 60 to 90 metres due to the change in the composition of the trains from 4 to 6 cars, and included the opening of two new vestibules, one with access to Doctor Esquerdo pares and the other to street named as Calle de Sánchez Barcaiztegui, closing the original vestibule. It was subsequently restored for its reopening to the public, forming part of the Metro de Madrid suburban museum complex.

10.6. Conclusions

Industrial heritage in Europe represents a vital part of the continent's economic and technological history, showcasing the evolution of industries that contributed significantly to the development of modern economies. Many important companies across Europe have left behind remarkable industrial legacies, ranging from manufacturing and energy production to transportation and telecommunications. The case of Metro de Madrid is a paradigm shift in Europe.

Industrial heritage plays a significant role in contemporary society, as it connects the past to the present while fostering cultural, educational, and economic benefits. The case-study of Metro de Madrid is a very good example. It helps to maintain the cultural identity of a territory and memory. Industrial heritage preserves the legacy of industrialization, honoring the contributions of workers and communities that shaped modern economies and societies.

Also, in the case of Metro de Madrid, it supports the urban regeneration. Repurposing industrial sites into cultural, residential, or com-

mercial spaces revitalizes urban areas, blending history with modern functionality. Adapting old industrial structures reduces environmental impact by reusing materials and minimizing new construction.

Furthermore, it is a tool for education and awareness. The analyses of the Metro de Marid case provide insights into technological progress, innovation, and social changes during the industrial era, fostering an appreciation for historical advancements in the case of Spain, but it is valid for the rest of Europe. Our industrial heritage ensures that the transformative era of industrialization continues to inform and inspire future generations in the case of Spain

Also, in the case of Madrid, as a top destination for tourism, is a key element of the economic growth. In the case of Metro de Madrid, its industrial heritage sites attract visitors, boosting local economies and creating opportunities for sustainable tourism in the city for local workers.

The value of the heritage of the Madrid metro has been highlighted once again thanks to the celebration of the 150th anniversary of the architect Antonio Palacios, in 2024. He was born in 1874 in Galicia. Nowadays, Antonio Palacios is renowned for his influential contribution to modernist and rationalist architecture in Spain. His buildings, dating from the early 20th century, are still part of the capital's skyline. Witness to an era of great change, he was a key figure in the renovation and modernity of Madrid, where he designed some of its most emblematic buildings. He is also the creator of the designs and aesthetics of the first underground lines, the organisation of its accesses and the logo of the Metro diamond, among many other works.

Finally, this short study confirms that the study of our industrial heritage is an academic tool for inspiration and innovation, from a scholar point of view. These sites offer creative spaces and inspiration for contemporary research on the fields of Communication Studies, apart from the fields of Arts, Design, and Architecture.

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